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(21) (A1) 2,075,014
(22) 1992/07/30
(43) 1993/02/01

5,043,5/41

(51) INTL.CL.[5] E04B-002/74

(19)(CA) **APPLICATION FOR CANADIAN PATENT** (12)

(54) Modular Wall Panel System

(72) Oswald, Douglas G. - U.S.A. ;
Rheault, Alan E. - U.S.A. ;
Yamre, Howard - U.S.A. ;
Yarme, Judith - U.S.A. ;

(71) American Seating Company - U.S.A. ;

(30) (US) 738,396 1991/07/31

(57) 7 Claims

Notice: This application is as filed and may therefore contain an incomplete specification.

Canada

CCA 3254 (10-92) 41 7530-21-936-3254

MODULAR WALL PANEL SYSTEM

BACKGROUND OF THE INVENTION

The present invention relates generally to frame systems and more particularly to frames used in modular wall panel systems.

The design of most modern interior work spaces, especially offices, must possess the fundamental ability to adapt to change. Small changes must be responded to -- such as recognizing an employee's promotion — as well as major changes -- such as adding employees. Because modern interior space designs must accommodate changing environments, the vast majority of today's building interior spaces are designed using prefabricated modular wall panel systems. These modular systems allow work areas to be expanded, redesigned, or even eliminated at only a fraction of the cost associated with revamping non-modular designs. The fundamental building block of most modular wall panel systems is a generally rectangular frame comprised of horizontal rails and vertical stiles. Typically, the frames are joined in an end-to-end relationship thereby forming a continuous wall. The frame structure generally includes a raceway for routing wires, cables, or other utility services. Also, it is common for one or more horizontal rails to be accessible for engaging and supporting vertical loads such as writing surfaces, shelving, and the like.

A common drawback associated with prior art wall panel systems is that the horizontal rails are noncontinuous across adjoining frames. This typically occurs in frame designs where the horizontal rail terminates short of the end of the frame and the frame end portion is fitted with a peripheral trim member or the like. Consequently, when two frames are adjoined

in an end-to-end relationship, the horizontal rails are noncontinuous across the frame-to-frame interface. While this type of discontinuity may not be unduly restrictive in some applications, it reduces the number of locations whereby a load may be placed along the rail. Accordingly, in these types of wall panel systems the placement of accessories along the horizontal rail may be dictated more by the shortcomings inherent in the noncontinuous rail system than by the desires of the interior designer.

Additionally, although many wall panel systems are fitted with a raceway to accommodate utilities, the raceway is typically confined to one dimension and accordingly, does not lend itself to routing utilities in two or three dimensions.

An ever present concern associated with designing, producing and installing wall panel systems is that of containing cost. One major cost involves connectors and other hardware used to install wall panels. One approach to reducing hardware costs is to design a fastener which has universal applicability for adjoining wall panel frames regardless how, or at what angle, the wall panel frames are joined. It is also desirable to design a universal connector which will accommodate mounting a first wall panel frame anywhere along the horizontal rail of a second wall panel frame.

Accordingly, it is an object of this invention to provide a modular wall panel frame having three dimensional raceway capability.

It is a further object of this invention to provide a frame member for use in a modular wall panel system that provides a means for connecting adjacent frames to form a continuous wall and also provide a frame member which supports vertical loads.

It is still a further object of the present invention to provide a universal connector which is used to connect adjoining frames regardless of the relative angle between the two frames.

A further object of this invention is to provide a universal connector which allows a first frame to be mounted along a second frame at a point intermediate the ends of the second frame.

Another object of the present invention is to provide a frame member, which when joined to other frame members, provides a continuous horizontal rail across joined frames.

SUMMARY OF THE INVENTION

In light of the foregoing objects, in one aspect, the present invention provides a frame member for use in a modular wall panel system, the frame member including an elongated body having a first wall, second wall, and a connecting wall, the connecting wall extending between and connected to the first and second walls to maintain the first and second walls in a fixed, spaced-apart relationship to one another. The first and second walls define an inner surface and an outer surface and the first and second walls each include a free end where the free ends of the first and second walls define an elongated entrance opening. The inner surfaces of the first and second wall form a boundary of a rear zone and a forward zone. The inner surfaces of the first and second wall bounding the rear zone include means for engaging and retaining a first connector therebetween. The inner surfaces of the first and second wall bounding the forward zone include means for engaging and retaining a second connector therebetween. The

inner surfaces of the first and second wall include means for maintaining the first and second connectors in a spaced-apart relationship whereby when the first connector is disposed in the rear zone and the second connector is disposed in the forward zone, the first and second connectors are free to move within their respective zones without interfering with one another. Preferably, the outer surface of one of the first and second walls includes means for engaging and retaining a panel. The connecting wall of the frame member preferably includes a generally planar external surface for facilitating mounting the member to a support structure.

In a second aspect, the present invention provides a wall panel for use in a modular wall panel system. The wall panel includes first and second spaced-apart horizontal frame members and first and second spaced-apart vertical frame members wherein the first and second horizontal frame members are each connected to a vertical frame member. Each frame member including an elongated body having a first wall, second wall, and a connecting wall, the connecting wall extending between and connected to the first and second walls to maintain the first and second walls in a fixed, spaced-apart relationship to one another. The first and second walls define an inner surface and an outer surface and the first and second walls include a free end which defines an elongated entrance opening. The inner surfaces of the first and second walls form a boundary of a rear zone and a forward zone. The inner surfaces of the first and second wall bounding the rear zone include means for engaging and retaining a first connector therebetween and the inner surfaces of the first and second wall bounding the forward zone include means for engaging and retaining a second connector therebetween. The inner surfaces of the first and second wall include means for maintaining the first and second connectors in a spaced-apart relationship whereby when the first connector is

disposed in the rear zone and the second connector is disposed in the forward zone, the first and second connectors are free to move within their respective zones without interfering with one another. Preferably, the outer surface of one of the first and second walls of each frame member includes means for engaging and retaining a panel. In a preferred embodiment, the connecting wall of each frame member includes a generally planar external surface for facilitating mounting the frame members to one another to form the wall panel.

In an additional aspect, the present invention provides a frame structure for use with a modular wall panel system. The frame structure includes two spaced-apart stiles, each stile having a front face and a rear face. The frame structure also includes first, second, third, and fourth rails, the first and second rails are spaced-apart and connected to the front faces of each of the two stiles, wherein the first and second rails form a front pair of rails. The third and fourth rails are spaced-apart and each connected to the rear face of each of the two stiles, the third and fourth rails forming a rear pair of rails, wherein the rear pair of rails are spaced-apart from the front pair of rails. The space between the two spaced-apart stiles creates a raceway along a first direction, and the space between the front pair of rails creates a raceway along a second dimension, and the space between the rear pair of rails creates a raceway along the second dimension spaced-apart from the raceway created by the front pair of rails, and the space between the spaced-apart stiles in conjunction with the space between the front pair of rails in further conjunction with the space between the rear pair of rails creates a raceway along a third dimension whereby the first, second, and third dimensions are mutually orthogonal. In a preferred embodiment, the stiles and rails which make up the frame structure are made from substantially the same type of

frame member, each frame member including an elongated body having a first wall, second wall, and a connecting wall, the connecting wall extending between and connected to the first and second walls to maintain the first and second walls in a fixed, spaced-apart relationship to one another. The first and second walls define an inner surface and an outer surface and the first and second walls each include a free end. The free ends of the first and second walls define an elongated entrance opening. The inner surfaces of the first and second wall form a boundary of a rear zone and a forward zone. The inner surfaces of the first and second wall bounding the rear zone include means for engaging and retaining a first connector therebetween and the inner surfaces of the first and second wall bounding the forward zone include means for engaging and retaining a second connector therebetween. The inner surfaces of the first and second wall include means for maintaining the first and second connectors in a spaced-apart relationship whereby when the first connector is disposed in the rear zone and the second connector is disposed in the forward zone, the first and second connectors are free to move within their respective zones without interfering with one another. Preferably, the outer surface of one of the first and second walls of each frame member includes means for engaging and retaining a panel. The connecting wall of each frame member preferably includes a generally planar external surface for facilitating mounting said frame members to one another. Preferably each of the stiles is made from two frame members fastened together such that the generally planar external surfaces of the frame members are abutted.

Still in another aspect, the present invention provides a continuous rail frame structure for use in a modular wall panel system. The frame structure comprises two spaced-apart vertical stiles, each stile having a front face and first and second spaced-apart horizontal rails, each rail being

connected to each one of the two spaced-apart stiles. The horizontal rails are connected to the vertical stiles such that each horizontal rail extends across the face of each stile whereby when the horizontal rails of two frame structures are placed in an end-to-end relationship, the horizontal rails of each frame structure abut one another thereby forming a continuous horizontal rail across the two frame structures. Preferably the vertical stiles of the frame structure include a rear face, and preferably the frame structure further includes third and fourth rails, the first and second rails spaced-apart and each connected to the front faces of each of the two stiles, the first and second rails forming a front pair of rails. The third and fourth rails are spaced-apart and each connected to the rear faces of each of the two stiles. The third and fourth rails forming a rear pair of rails wherein the rear pair of rails are spaced-apart from the front pair of rails. The space between the two spaced-apart stiles creates a raceway along a first dimension, and the space between the front pair of rails creates a raceway along a second dimension, and the space between the rear pair of rails creates a raceway along the second dimension which is spaced-apart from the raceway created by the front pair of rails, and the space between the spaced-apart stiles in conjunction with the space between the front pair of rails in further conjunction with the space between the rear pair of rails creates a raceway along a third dimension whereby the first, second, and third dimensions are mutually orthogonal. Preferably, the stiles and rails are made from substantially the same type of frame member wherein each frame member includes an elongated body having a first wall, second wall and a connecting wall, the connecting wall extending between and connected to the first and second walls to maintain the first and second walls in a fixed, spaced-apart relationship to one another. The first and second walls define an inner surface and an outer surface. The first and second walls each

include a free end which defines an elongated entrance opening. The inner surfaces of the first and second wall form a boundary of a rear zone and a forward zone wherein the inner surfaces of the first and second wall bounding the rear zone include means for engaging and retaining a first connector therebetween and the inner surfaces of the first and second wall bounding the forward zone include means for engaging and retaining a second connector therebetween. The inner surfaces of the first and second wall include means for maintaining the first and second connectors in a spaced-apart relationship whereby when the first connector is disposed in the rear zone and the second connector is disposed in the forward zone, the first and second connectors are free to move within their respective zones without interfering with one another. Preferably, the outer surface of one of the first and second walls of each frame member includes means for engaging and retaining a panel and, the connecting wall of each frame member preferably includes a generally planar external surface for facilitating mounting the frame members to one another. Preferably each stile includes two frame members fastened together such that the generally planar external surfaces of the frame members are in a face-to-face relationship.

Still, in a further aspect, the present invention provides a universal connector for use in connecting two or more frame members together, the frame members of the type having spaced-apart inner surfaces. The universal connector includes a first inserting end, a second inserting end, and means for pivotally connecting said first inserting end with said second inserting end. Each inserting end includes an expanding means for expanding the respectively associated inserting end. When the inserting end is disposed between the spaced-apart inner surfaces of a frame member and when the expanding means on each of the inserting ends is actuated, the expanding means frictionally engages the spaced-apart inner surfaces of its

respective frame member thereby connecting two frame members together. Each expanding means preferably includes a cam member pivotally connected to its respectively associated inserting end. The cam member preferably includes a pin for pivotally connecting the cam to its respective inserting end, wherein each pin is adapted to rotate its cam, thereby engaging the cam against the spaced-apart inner surfaces of the associated frame member. The pin preferably comprises a screw.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is an isometric view of an interior office layout constructed from the modular wall panels of the present invention.

Figure 2 is a isometric view of an interconnection of frame portions of the modular wall panels of the present invention.

Figure 3 is an end view of the wall panel of the present invention.

Figure 4 is an isometric view of a partial portion of an insert for use on the wall panel of the present invention.

Figure 5 is an isometric view of a partial portion of a kick panel for use on the wall panel of the present invention.

Figure 6 is a top cross-sectional view of the wall panel of the present invention taken substantially along line 6-6 of Figure 3.

Figure 7 is an isometric view of a load bearing connector for use in the wall panel system of the present invention.

Figure 8 is a cross-sectional view of a preferred embodiment of a horizontal frame member of the present invention.

Figure 9 is a front cross-sectional view of the wall panel of the present invention taken substantially along line 9-9 of Figure 3.

Figure 10 is an exploded view of two wall panel frames of the present invention adjoined in an end-to-end relationship.

Figure 11 is an isometric view of the universal connector of the present invention.

Figure 12 is an expanded view of portions of two adjoining wall panel frames.

Figure 13 is a top view of two adjoining wall panel frames taken substantially along lines 13-13 of Figure 12.

Figure 14 is a cross-sectional view of the combination of horizontal rail and universal connector taken substantially along lines 14-14 of Figure 12.

Figure 15 is a cross-sectional view of the combination of horizontal rail and universal connector taken substantially along lines 15-15 of Figure 12.

Figure 16 is a top view of the universal connector of the present invention as it is used to connect 3 wall panels of the present invention.

Figure 17 is an isometric view of two wall panel frames of the present invention stacked in vertical relation.

Figure 18 is a cross-sectional view of the wall panel frame taken substantially along lines 18-18 of Figure 17.

Figure 19 is a front view of the rail and stile interconnection taken substantially along lines 19-19 of Figure 18.

Figure 20 is a side view of the wall panel system of the present invention showing a work surface engaged in and supported by a horizontal rail.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Now referring to Figure 1, wall panel system 30 is comprised of a plurality of generally rectangular modular wall panels 32. Each wall panel 32 includes a plurality of horizontal rails 34-42 which are adapted to engage and support various accessories such as cabinet 44, shelf unit 46, and work surface 48.

Now referring to Figures 1 and 2, each wall panel 32 comprises frame structure 50. Frame structure 50 is comprised of a plurality of horizontal rails 34-42 and two vertical stiles 52, 54. Each horizontal rail 34-42 is fastened to a front face 56, 58 of each respective vertical stile 52, 54. Similarly, horizontal rails 60-68 are arranged along the rear faces 70, 72 of vertical stiles 52, 54 respectively. When horizontal rails 36-42 and 62-68 are arranged along respective faces 56, 58 and 70, 72 of vertical stiles 52, 54, frame structure 50 functions to service two adjoining work spaces.

One important aspect of the present invention relates to the ability of frame structure 50 to form a three dimensional raceway for accommodating the passage of wire, cables, utilities or the like. This three-way raceway capability is best understood by referencing Figure 3. For example, because horizontal rails 36-42 are spaced-apart from horizontal rails 62-68, cable 76 is able to traverse frame structure 50 along the Y dimension. The space created between spaced-apart horizontal rails 36-42 creates a raceway along an X dimension. Accordingly, cable 76 is free to traverse frame structure 50 along the X dimension. A raceway is created through frame structure 50 along a Z dimension by virtue of the fact that the raceway along the X dimension and the raceway along the Y dimension intersect one another thereby forming a raceway along the Z dimension. The above illustrated three dimensional raceway capability forms an important aspect of the present invention. Unlike prior art systems which utilize a single dimensional raceway (which typically travels along the lower portion of the wall panel) frame structure 50 of the present invention allows increased flexibility of cable and utility routing through the wall panel system of the present invention.

Now referring to Figures 3-9, frame 50, which forms part of modular wall panel 32, can be used by itself or can be used with any number of inserts 78-88. Although inserts 78-88 can be used to fill the opening (exemplified at 90) between two vertically-spaced horizontal rails, they may also be used to bridge the opening between two horizontal rails. For example, insert 82 is designed to bridge gap 90 between vertically offset horizontal rails 40, 42 thereby creating a concealed raceway along the X axis. This provides a means for routing cable 76 through frame 50 along the X dimension and also for concealing its presence. Inserts 78-88 are made from a full range of

materials, colors, and finishes and are preferably interchangeable. For example, inserts 78-88 may be comprised of painted or powder-coated steel, fabric, sound deadening material, wood and glass (including mirrors, frosted, colored glass, etc.). Special function materials and finishes such as marker inserts, static and chemical resistant finishes, radio frequency shielding inserts, etc. may also be used.

Inserts 78-88 preferably snap into place without the use of tools. Preferably this is accomplished by designing inserts (see Figure 4) with an insert attaching finger 92 which is adapted to frictionally engage an outer surface of horizontal rail 42. By fitting each insert with a plurality of inserts attaching fingers 92, the panels 82 may be installed and removed without the use of tools. Each modular wall 32 preferably includes kick panel 94. Kick panel 94 primarily serves to conceal adjustment leg 96. Kick panel 94 also acts to "dress" or visually frame the lower portion of each wall panel. Each kick panel 94 (exemplified in Figure) is fitted with a plurality of kick panel attaching fingers 98. Kick panel attaching fingers 98 are adapted to matingly engage with an inner surface of a horizontal rail thereby firmly securing kick panel 94 in place. As was discussed in conjunction with inserts 78-88, kick panel 94 is adapted to be installed and removed without the use of tools.

End trim panel 100 (see Figure 6) is adapted to cover the terminal end of a modular wall panel. Each end trim panel 100 is fitted with an end trim engaging finger 102 which is adapted to be received in and retained by an inner surface 104 of stile 52.

Load bearing connector 106 (see Figure 3) is adapted to support vertical loads (such as accessories) which are placed

on horizontal rails 60-68. One embodiment of load bearing connector 106 is shown in Figure 7. In this embodiment, body portion 112 separates rail engaging end 108 from load engaging end 110. Rail engaging end 108 is designed to be inserted through opening 114 of horizontal rail 40 (see Figure 3). Once rail engaging end 108 is inserted through opening 114 of horizontal rail 40, load bearing connector 106 is rotated 90 degrees thereby positively engaging rail engaging end 108 against an inner surface 126 of horizontal rail 40. Any number of accessories 44-48 can be attached to connector 106 by way of threaded aperture 116 or any other conventional fastening technique.

In a preferred embodiment, horizontal rails 36-42 and 60-68 are comprised of frame member 118 as set out in Figure 8. Frame member 118 is comprised of an elongated body having a first wall 120, a second wall 122 and a connecting wall 124. First and second walls 120, 124 define an inner surface 126 and an outer surface 128. Walls 120, 122 include free ends 130, 132 respectively which define entrance opening 114. Inner surface 126 of walls 120, 122 forms a boundary of rear zone 134 and forward zone 136. One function of forward zone 136 is to engage and support load bearing connector 106. Rear zone 134 is preferably used to cooperate with universal connector 144 for joining two modular wall panels together. The function and use of universal connector 144 will be disclosed in conjunction with Figures 9-15. Outer surface 128 of frame member 118 is used to support insert attaching finger 92 of insert 82 as was previously discussed in conjunction with Figure 4.

First wall 120 and second wall 122 are both fitted with cusp portion 138, 140 respectively. Each cusp 138, 140 acts to separate a connector residing in forward zone 136 from a connector residing in rearward zone 134. This separation is an

important aspect to the present invention in that two connectors may reside side-by-side each in a respective zone and each are free to move within their respective zone without referring to one another. For example, if universal connector 144 of Figure 11 were placed in rear zone 134 of frame member 118 and load bearing connector 106 were placed in forward zone 136 of frame member 118, they each would be free to move laterally within their zone (along the length of frame member 118), without interfering with one another. Thus, it is seen that any accessories 44-48 supported by a load bearing connector, may be slid along their respective horizontal rails 118 without interfering with any universal connectors residing in rear zone 134. This has the distinct advantage of not requiring that any connectors 106, 144 be removed before relocating a connector within its respective zone. Connecting wall 124 of frame member 118 preferably includes generally planar external surface 142 for facilitating mounting frame member 118 to a support structure (such as vertical stile 52).

Figure 9 discloses a preferred embodiment of frame structure 50 wherein each horizontal rail 40, 42 extends across the full face 56, 58 of its respective stile 52, 54. By constructing frame member 50 in this way, horizontal rails 40, 42 abut adjacent horizontal rails 41, 43 of adjacent frame 51 (abutment shown at 47, 49 respectively). By constructing the frames in this manner, the horizontal rails form a continuous, load bearing track along the length of a wall formed by a plurality of frames 50, 51. This continuous track permits tremendous design flexibility in that accessories 44-48 can be mounted at any horizontal location along a wall formed by the panels. Thus, it is easily seen, in contrast to the prior art, that the beginning and end demarcations of adjoining wall panels 47, 49 have no bearing on the placement of accessories 44-48 along a wall constructed from the wall panel system of the present invention.

Now referring to Figure 10, universal connector 144 is used to fasten adjacent frames 50, 51 in order to construct the wall panel system of the present invention. Universal connectors 144 are adapted to engage the rear zone portions 134 (see Figure 8) of abutting horizontal rails (exemplified at 42, 43) thereby joining abutting frames 50, 51.

Now referring to Figure 11, universal connector 144 is comprised of first and second inserting ends 146, 148 and hinge 150. Hinge 150 pivotally connects inserting ends 146, 148. Each inserting end 146, 148 includes an opening 152 wherein rotatable cam 154 is housed. Rotatable cam 154 is pinned in place by way of screw 156. By rotating screw 156, rotatable cam 154 can be made to completely retract 153 within opening 152. Rotating cam 154 can be made to translate from its fully retracted position 153 (totally contained within opening 152) to its fully extended position 151 by simply rotating screw 156 through 90 degrees.

Now referring to Figures 12-15, when it is desired to connect two frames 50, 51 in an end-to-end relationship, frames 50, 51 are placed in an end-to-end abutting relationship, as shown in Figure 12, and universal connector 144 is passed through opening 114 and through forward zone 136 of two abutting horizontal rails 42, 43 and inserted into rear zone 134 portion of rails 42, 43. Screw 156 is then rotated 90 degrees thereby translating cam 154 into its maximum extension position (see Figure 14) whereby it frictionally engages inner surface 126 of rear zone 134. This frictional engagement positively locks universal connector 144 between abutting horizontal rails 42, 43 thereby forming a secure attachment between adjacent frames 50, 51.

Although our discussion until now has confined the use of load bearing connector 106 to forward zone 136 of

horizontal rail member 43 (see Figure 3) and the use of universal connector 144 has been limited to rear zone 134 of horizontal rail member 43 (see Figure 14), it is contemplated within the present invention that universal connector 144 may operate from either forward zone 136 or rear zone 134 of horizontal rail member 43. The type of application where this would be favorable is disclosed in Figure 16. In Figure 16, there is depicted a top view of an intersection between three adjacent frames 50, 51, and 53. Frames 50, 51 are joined end-to-end by universal connector 144 in the same method that was discussed previously in conjunction with Figures 10-15. Frame 53 is attached to frames 50, 51 by disposing universal connectors 144' and 144'' in the forward zones 136 of horizontal rails 41, 42 and 39, 43 respectively. Because connector 144 is confined to the rear zone 134 of horizontal rails 42 and 43, it cannot interfere with the portions of universal connectors 144' and 144'' which are confined to the forward zones 136 of horizontal rails 42 and 43. Accordingly, frame 53 is free to be located laterally 158 anywhere along the wall segment comprised of frames 50, 51. It is even possible to locate frame 53 across end wall joint 160 because of the continuous, non-interrupted, nature in which horizontal rails 42, 43 are joined. Thus, it is seen that end wall joints 160 do not hinder the placement of return frame 53 even if it falls directly on end wall joint 160. Accordingly, end wall joint 160 has no bearing on the placement or arrangement of accessories 44-48 or intersecting wall 53. Thus, the wall panel system of the present invention offers an interior designer maximum flexibility in the design of interior-space systems.

Now referring to Figure 17, in the same manner in which it has been shown that frames 50, 51 can be placed in an edge-to-edge relationship to form a continuous wall, they likewise can be stacked one on top another in the manner shown

in Figure 17. This vertical stacking capability gives an interior designer extra flexibility in designing an interior office space. In a preferred embodiment, the vertical stiles (exemplified at 55 in Figure 18) are fabricated from the identical material used for fabricating horizontal rails 36-42 and 60-68. Stiles 55 are preferably fabricated from two horizontal rail "type" members wherein their generally planar external surfaces 166, 168 abut. By fabricating stile 55 in this manner, universal connectors 144 can be used to attach vertically stacked frames 50, 51 to one another in the same manner the universal connectors are used to adjoin frames 50, 51 in an end-to-end relationship. Thus, it has been demonstrated that universal connector 144 is indeed universal in its ability to attach modular frame sections together. This applies attaching vertically stacked frames, attaching frames in an end-to-end relationship, and attaching frames in the manner depicted in Figure 16.

Now referring to Figures 18 and 19, it is preferred that horizontal rail 43 is attached to vertical stile 55 by way of threaded fastener 170 and T-nut 172. It is also contemplated that load bearing fastener 106 can be directly used, or easily modified, to attach vertical stile 55 and horizontal rail 43.

Now referring to Figure 20, work surface 48 is supported from forward zone 136 of horizontal rail 43. Work surface 48 includes rail engaging finger 172 for positively engaging inner surface 126 of forward zone 136. For heavier loads where the load support design shown in Figure 20 is unsafe, load bearing connector 106 as depicted in Figure 7, is used.

The foregoing detailed description shows that the preferred embodiments of the present invention are well suited to fulfill the objects of the invention. It is recognized that

those skilled in the art may make various modifications or additions to the preferred embodiments chosen here to illustrate the present invention, without departing from the spirit of the present invention. For example, it is contemplated that various materials may be used to construct the horizontal and vertical frame members of the present invention. Such materials include plastics, steel, high density foams and the like. Accordingly, it is to be understood that the subject matter sought to be afforded protection hereby should be deemed to extend to the subject matter defined in the appended claims, including all fair equivalents thereof.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A continuous rail frame structure for use in a modular wall panel system, comprising:

two spaced-apart vertical stiles, each stile having a front face,

first and second spaced-apart horizontal rails, each said rail connected to each one of said two spaced-apart stiles,

wherein each said rail extends across the face of each said stile,

whereby, when the horizontal rails of a first and second one of said frame structures are placed in an end-to-end relationship, one of the horizontal rails of said first frame structure abuts one of the horizontal rails of said second frame structure thereby forming a continuous horizontal rail across said first and second frame structures.

2. The continuous rail frame structure of claim 1, wherein each one of said two spaced-apart vertical stiles includes a rear face, and wherein said frame structure further includes third and fourth rails, said first and second rails spaced-apart and each connected to said front faces of each of said two stiles, said first and second rails forming a front pair of rails, wherein

said third and fourth rails are spaced-apart and each connected to said rear faces of each of said two stiles, said third and fourth rails forming a rear pair of rails, and wherein said rear pair of rails are spaced-apart from said front pair of rails,

whereby said space between said two spaced-apart stiles creates a raceway along a first dimension, and whereby said space between said front pair of rails creates a raceway along a second dimension, and whereby said space between said rear pair of rails creates a raceway along said second dimension spaced-apart from said raceway created by said front pair of rails, and whereby the space between said spaced-apart stiles in conjunction with the space between said front pair of rails in further conjunction with the space between said rear pair of rails creates a raceway along a third dimension whereby said first, second, and third dimensions are mutually orthogonal.

3. The frame structure of claim 2, wherein each said stile and rail is made from substantially the same type of frame member, each said frame member including,

an elongated body having a first wall, second wall, and a connecting wall, said connecting wall extending between and connected to said first and second walls to maintain said first and second walls in a fixed, spaced-apart relationship to one another,

wherein said first and second walls define an inner surface and an outer surface, said first and second walls each including a free end, said free ends of said first and second walls defining an elongated entrance opening, and

wherein said inner surfaces of said first and second wall form a boundary of a rear zone and a forward zone, and

wherein said inner surfaces of said first and second wall bounding said rear zone include means for engaging and retaining a first connector therebetween, and wherein

said inner surfaces of said first and second wall bounding said forward zone include means for engaging and retaining a second connector therebetween, and

wherein said inner surfaces of said first and second wall include means for maintaining said first and second connectors in a spaced-apart relationship,

whereby when said first connector is disposed in said rear zone and said second connector is disposed in said forward zone, said first and second connectors are free to move within their respective zones without interfering with one another.

4. The frame structure of claim 3, wherein said outer surface of one of said first and second walls of each frame member includes means for engaging and retaining a panel.

5. The frame structure of claim 3, wherein said connecting wall of each frame member includes a generally planar external surface for facilitating mounting said frame members to one another.

6. The frame structure of claim 1, wherein each said stile includes two frame members fastened together.

7. The frame structure of claim 5, wherein each said stile includes two said frame members fastened together such that the generally planar external surfaces of said frame members are in a face-to-face relationship.

MODULAR WALL PANEL SYSTEM

ABSTRACT OF THE DISCLOSURE

A modular wall panel system comprising generally rectangular panels, each of which is fabricated from vertical stiles and horizontal rails. The panels are adapted to be mounted together in a side-by-side relationship or stacked upon one another in a vertical relationship. When the panels are mounted together in a side-by-side relationship, the horizontal rails form a continuous, load bearing track along the length of the wall formed by the panels. Accessory components such as cabinets and work surfaces are mountable to the panels along the continuous load bearing track. The horizontal rails not only form a means for mounting accessory to the wall panels, but they also provide a means for joining adjacent wall panels. Also disclosed is a universal connector for use in joining wall modules to form a continuous wall. A frame member is also disclosed which allows two rail connectors to be used without interfering with one another.

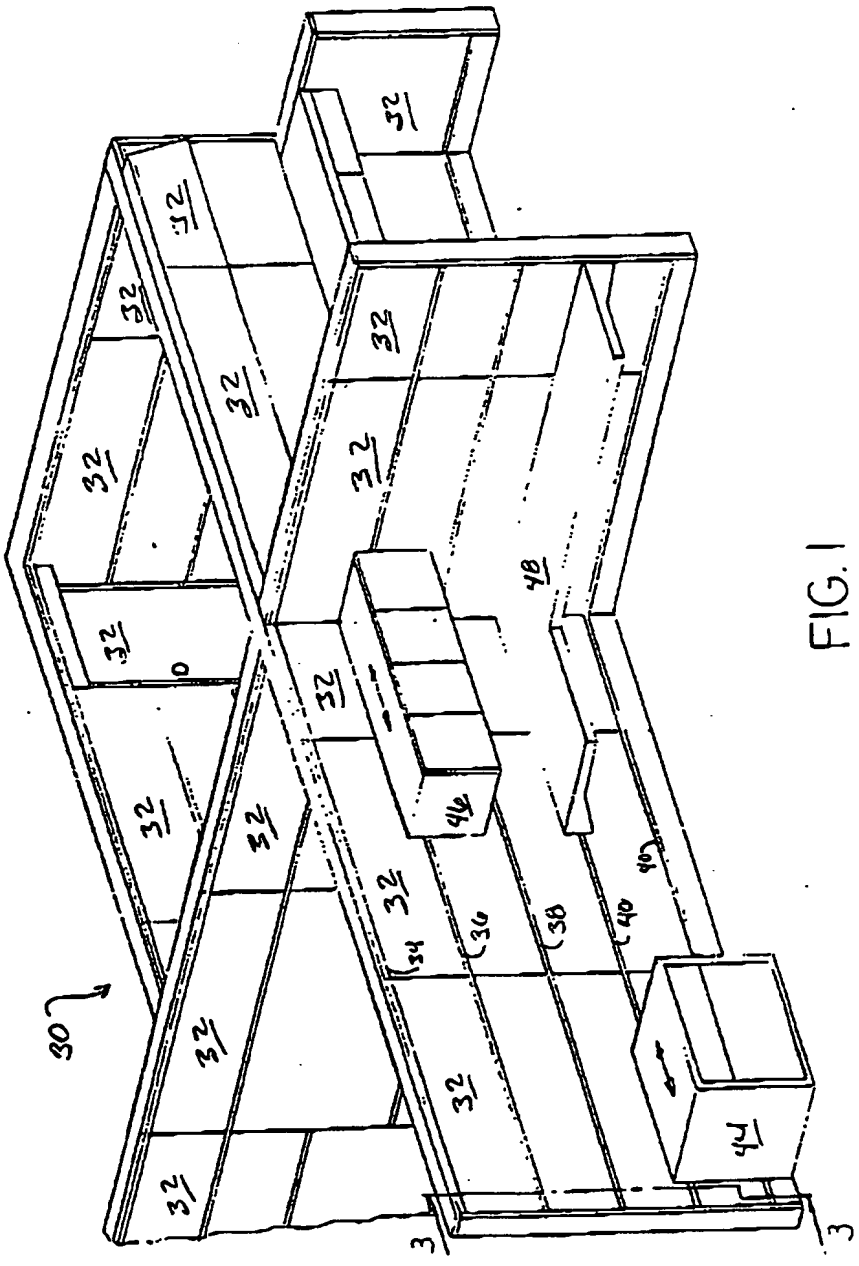

FIG. 1

Scott Aylor

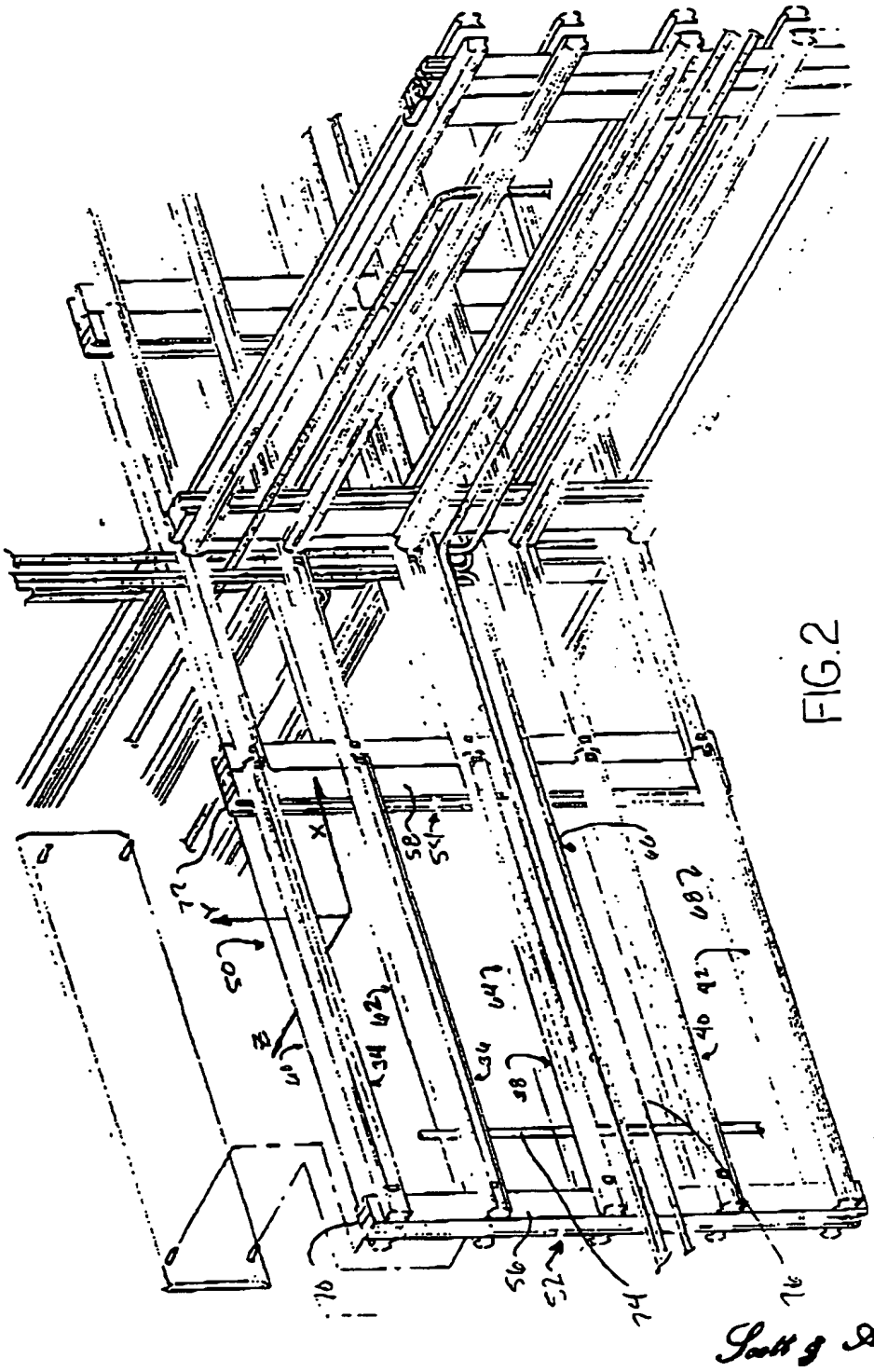

FIG.2

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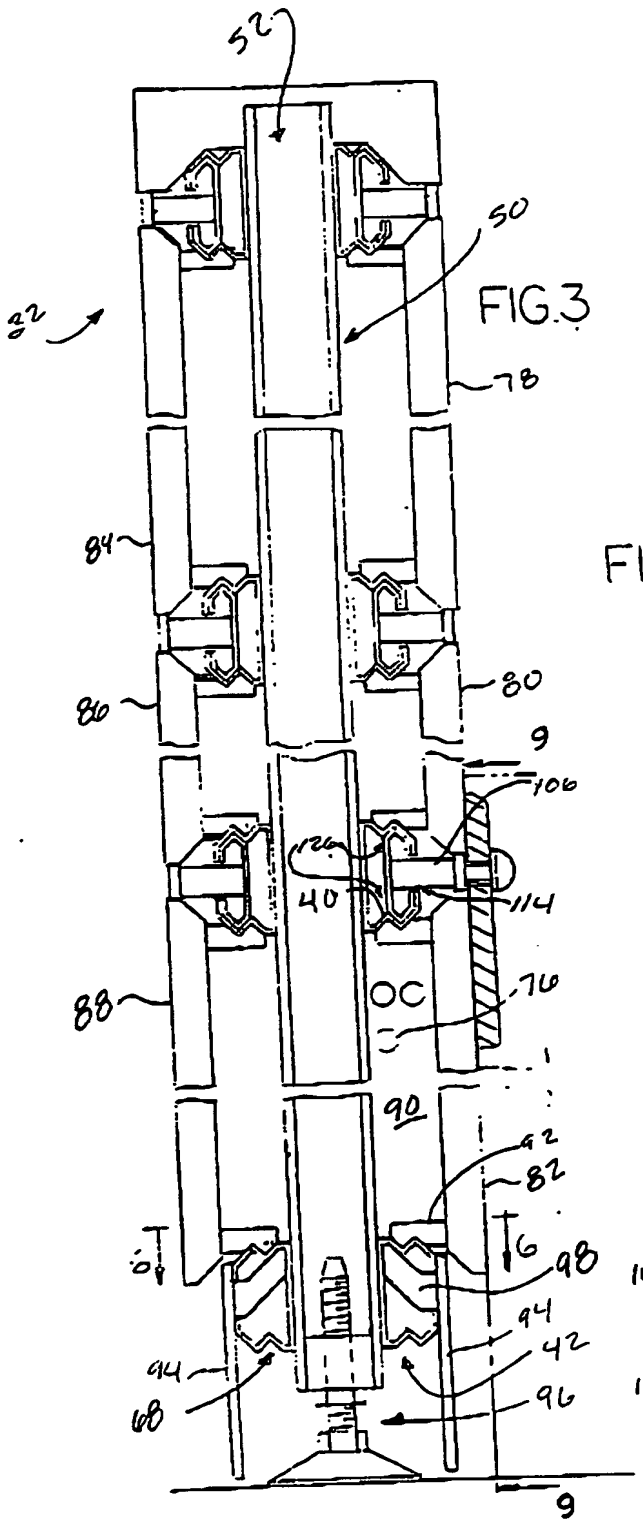


FIG.3

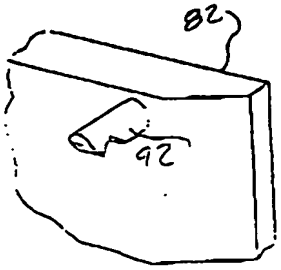


FIG.4

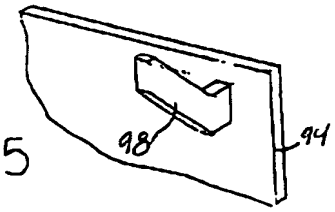


FIG.5

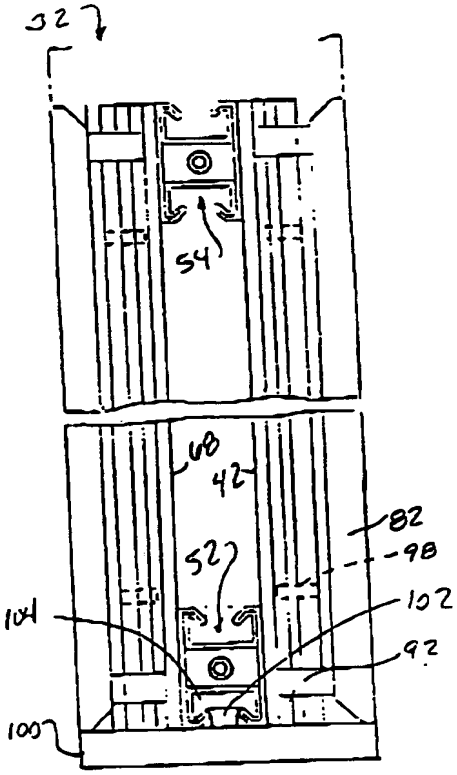


FIG.6

Scott & Aylen

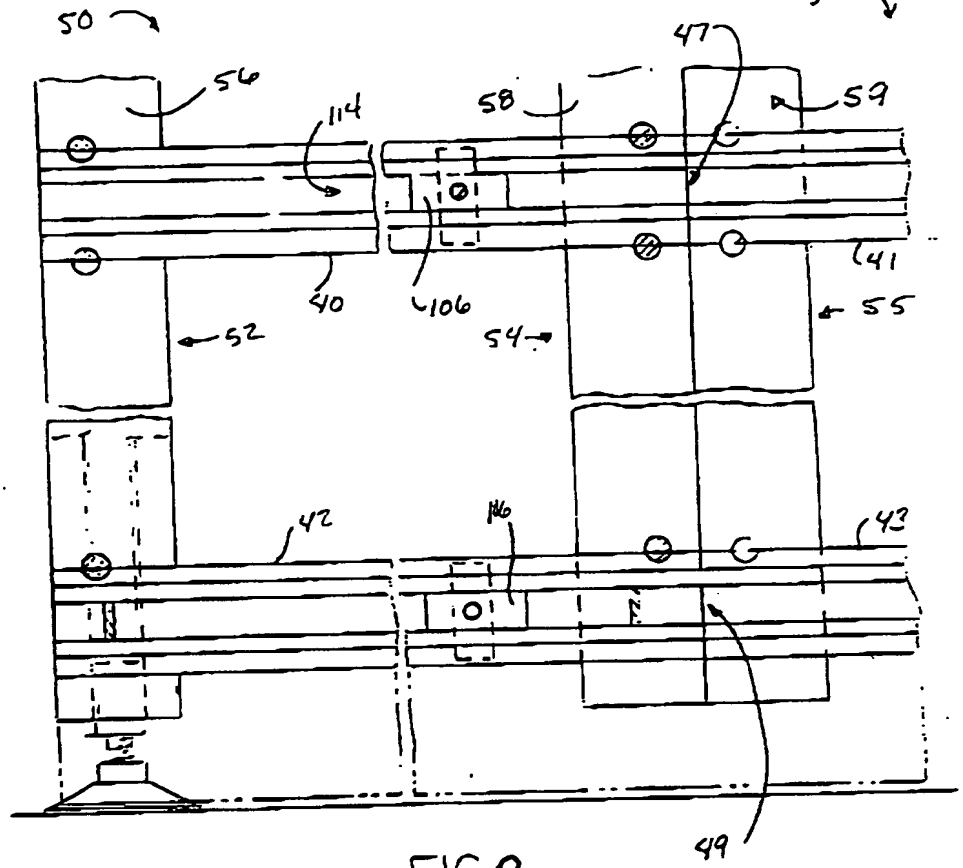
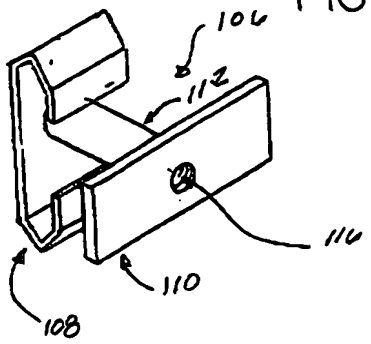


FIG.9

FIG 7



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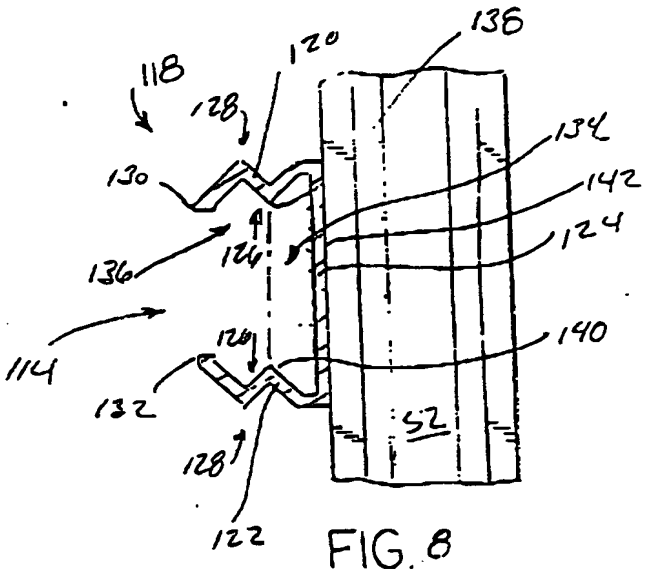

FIG. 8

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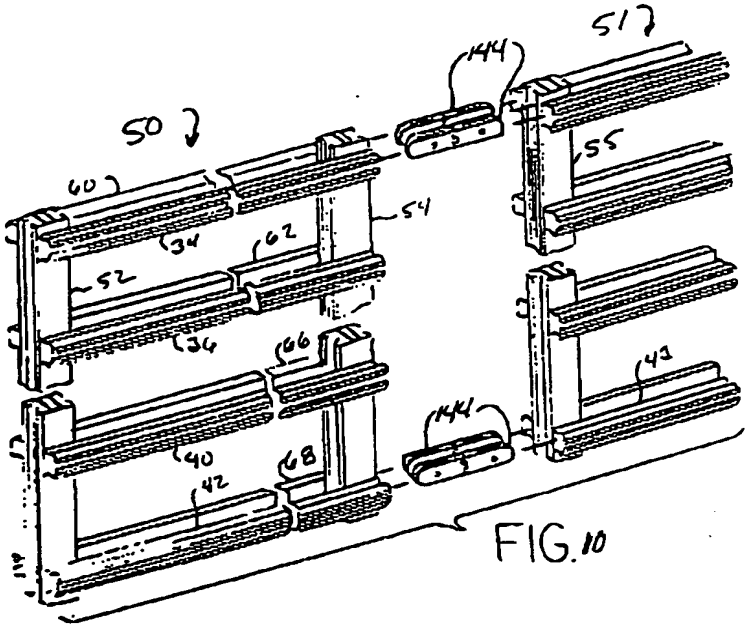

FIG. 10

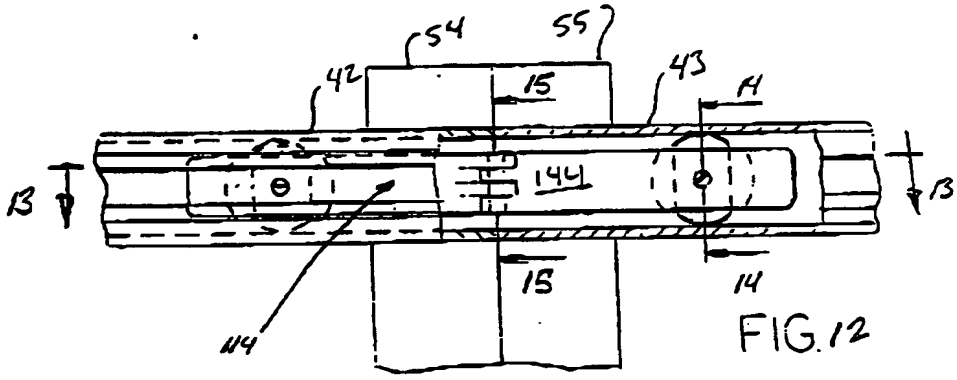

FIG. 12

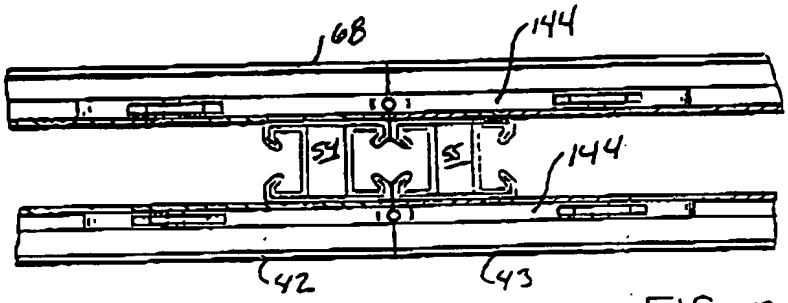

FIG. 13

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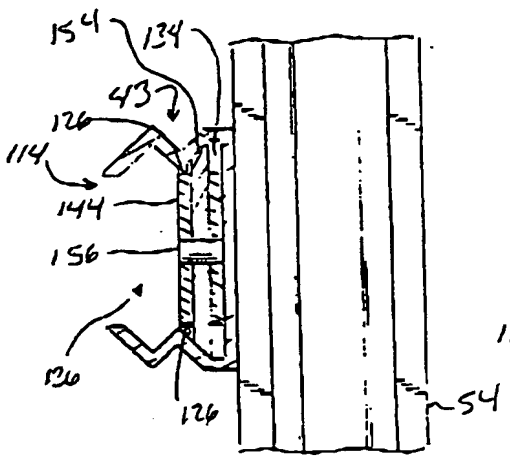

FIG. 14

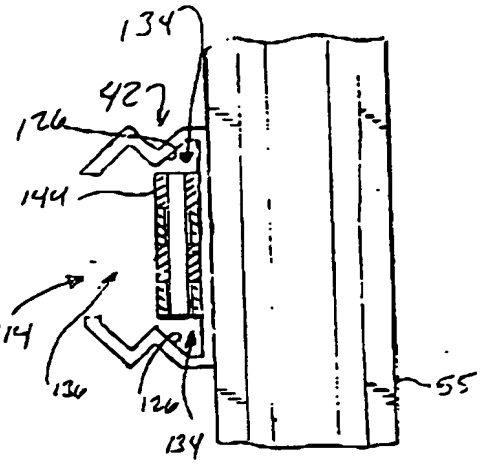

FIG 15

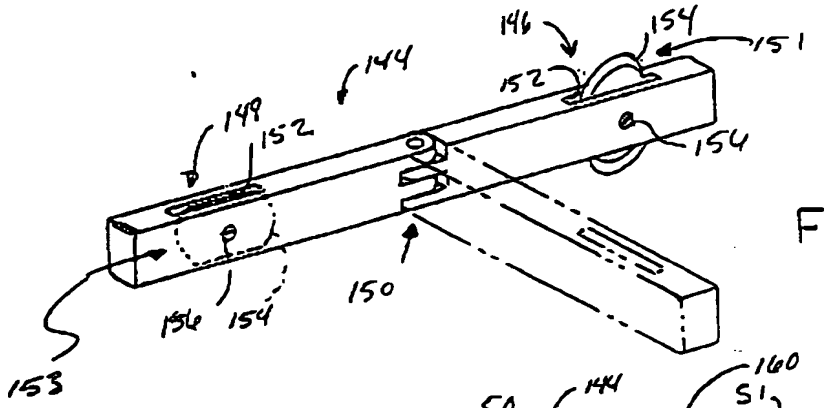

FIG 11

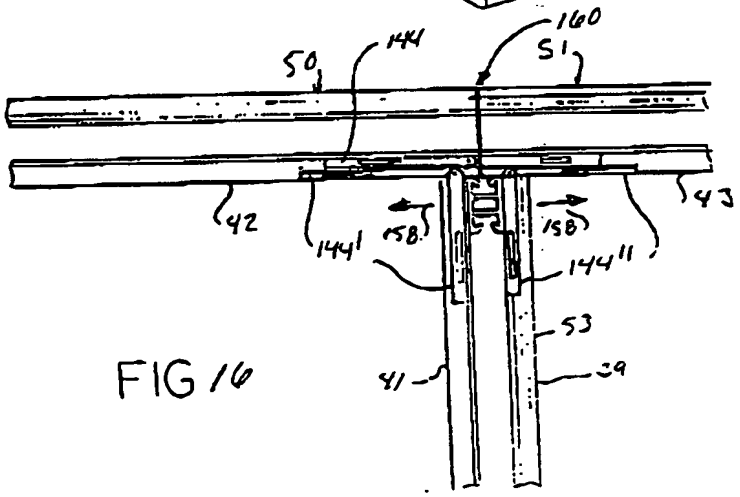

FIG 16

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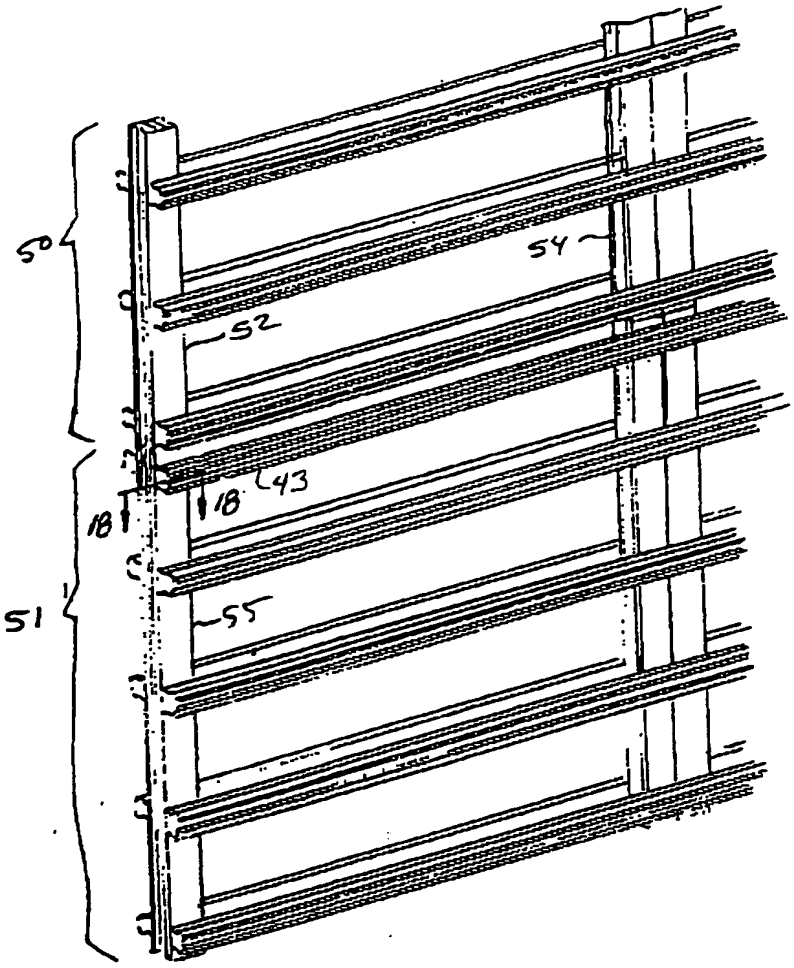

FIG. 17

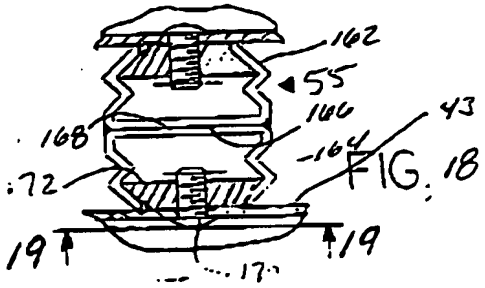

FIG. 18

Scott G Ayles

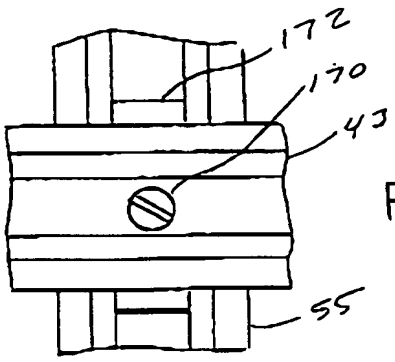

FIG. 19

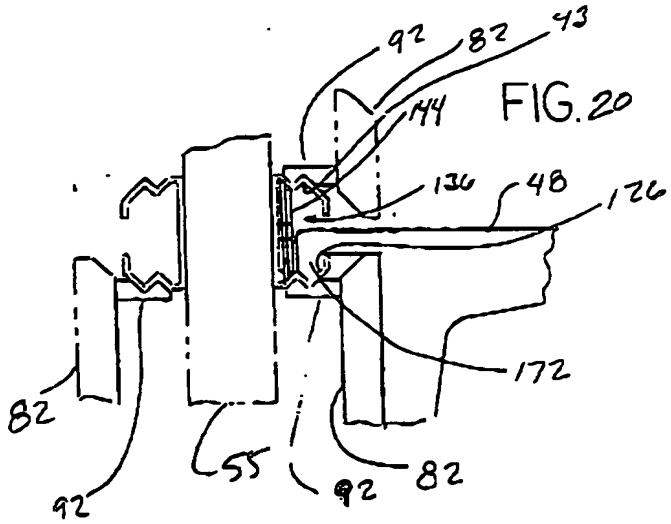

FIG. 20

Scott G Aylor